

Original Article

Comparison of open reduction internal fixation and conservative treatment plus open reduction internal fixation for calcaneal fractures

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Abstract: To compare the effect of open reduction internal fixation and conservative treatment combined with open reduction internal fixation for subjects with calcaneal fractures, 130 patients with calcaneal fractures were divided into observation group and control group. Observation group were treated with open reduction internal fixation and conservative treatment, control group treated as open reduction internal fixation. The healing related indicators, daily life activities ability score of observation group after treatment 6 months were significantly higher than that of the control group, there was no significant difference for the healing rate of excellent and good rate, the daily life activities ability score after one and three year between two groups. Open reduction internal fixation combined with conservative treatment in treatment of calcaneal fractures can clear anatomic structure and have fast function recovery. Thus, it should be as the preferred method for the treatment of calcaneal fractures.

Keywords: Calcaneal fractures, open reduction and internal fixation, conservative treatment

Introduction

Calcaneal fracture is a common clinical fracture, because of the difficult anatomical complexity, less soft tissue coverage and other factors, if without taking proper treatment can easily cause limb dysfunction, loss of labor within a short time [1]. Conservative treatment often used in clinical treatment and surgical treatment, which is disputes on the effect of above two kinds of methods [2].

Two independent systematic reviews [3, 4], including a recent Cochrane review, have examined the controlled evidence for the effectiveness of this surgery. All two reviews remarked on the paucity of evidence and the poor quality of studies to date. One suggested that surgery might lead to better functional recovery than conservative care, but all noted the risk of complications after surgery, including infection and the need for reoperation. All concluded that the available evidence is insufficient to choose the best management strategy for these fractures.

In this study, we assessed clinical effect that occurred after open reduction internal fixation

and conservative treatment of calcaneal fractures.

Subjects and methods

Subjects

Between June 2012 to June 2013, 130 patients who were treated operatively in our department were identified through the trauma registration system. The inclusion criteria were: aged 18 years and above; closed unilateral fractures; treated with surgical internal fixation; absence of poly trauma of the injured foot; computed tomography (CT) scans performed on the injured calcaneus; and absence of severe medical ailments. Patients with other concurrent fractures in both lower extremities were excluded. The subjects were divided into observation group and control group, each group has 65 cases. The observation group consist of 30 males and 35 females, aged 16-69 years, mean (41.24 ± 9.64) years old, according to the Essex-Lopresti classification, I type tongue-shaped fracture 17 cases, II compression fracture 29 cases, III type 19 cases of severe comminuted fracture; the control group consist of

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Table 1. Comparison of functional scores between observation group and control group [n (%)]

group	n	excellent	good	moderate	Poor	Rate of excellent/good
Observation	65	39	19	7	0	58 (89.23)
Control	65	32	24	7	2	56 (86.15)
χ^2						0.857
<i>P</i>						> 0.05

Table 2. Comparison of healing related indicators after treatment between observation group and control group [(± s), n (%)]

Group	n	Radiological (d)	full weight bearing (d)	Healing rate (%)
Observation	65	162.15 ± 17.32	219.32 ± 21.15	63 (96.92)
Control	65	121.21 ± 13.65	172.46 ± 17.38	62 (95.38)
<i>t</i> / χ^2		3.486	3.352	0.964
<i>P</i>		< 0.05	< 0.05	> 0.05

31 males and 34 females, aged 18-71 years, mean (43.05 ± 9.21) years old, according to the Essex-Lopresti classification, I type tongue-shaped fracture 18 cases, II type compression fractures in 28 cases, III type of serious fractures in 19 cases.

Treatment

The control group: Patients undergoing open reduction and internal fixation, as follows: 1) the surgical procedure: patients after spinal anesthesia, side lying position, to take lateral calcaneal extended L-shaped incision distal to make an incision cut directly to the periosteum blunt dissection, from the bottom up to the subtalar joint, forward to the calcaneocuboid joint, the peroneal tendons together with nerve flap flips. Kirschner wire bent tip soft tissue retractor to expose the lateral wall of the calcaneus bone and the subtalar joint, calcaneocuboid articular surface. Calcaneus and the first carrier from the sudden protrusion reset after the articular surface with periosteal stripping pry the collapse of the articular surface, restoring the calcaneus length, width, Bohler angle and Gissane corner. Intraoperative imaging confirmed the articular surface, the angle has been restored, with the distance joint, with the relationship between the articular surface of the dice together well and continued with the Steinmann pin into the boat with the cuboid bone and articular surface fixed. After shaping the calcaneus titanium plate implanted in the outer surface of the calcaneus, the front plate is vertically fixed calcaneus screws should be set at a fixed angle of tilt to sudden cardiac. Set

a rubber drainage strip, followed by suture layers bandaged.

Observer group: Apart from above treatment, observer group were also treated with conservative treatment, take the patient supine under local anesthesia, at the disposal of the calcaneal tuberosity 20 mm diameter Kirschner, the use of C-arm X-ray machine with traction recovery angle, his hands squeezing reset including wounds, plaster immobilization and proper perspective pressurized satisfaction. After giving

TCM Differential Treatment of fractures, taking huoxuehuayutang (Salvia 30 g, Angelica 9 g, red peony root 9 g, Millettia 15 g, peach 6 g, add 500 ml water and simmer till 200-300 ml, daily doses of 1), three weeks after remove the Kirschner wire fixation and removal of plaster, do exercises to restore joint function.

Outcome

Postoperative status of patients was evaluated by Maryland Foot Score [5], the total score was 0-100, the value of score between 90-100 indicated excellent; between 75 and 89, good; between 50 and 74, moderate; less than 50, poor.

Comparison of healing related indicators

Observed in patients receiving different treatment of fracture healing, including radiological complete healing time, full weight bearing ambulation time, completely healed proportion.

Activities of daily living scores

Observed in patients receiving different treatment activities of daily living (ADL), the use of ADL scales (Barthel Index) score [6], the higher the score, the stronger activity, limb recovery possible.

Statistical methods

SPSS 18.0 software was used for statistical analysis, chi-square test was used to compare of categorical data, t test was used to compare

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Table 3. Comparison of daily living scores of recent and long-term activities between two groups

Group	n	after-treatment 6 months	after-treatment 1 year	after-treatment 3 years
Observation	65	64.12 ± 8.46	72.15 ± 8.53	75.32 ± 8.42
Control	65	51.25 ± 5.35	70.23 ± 6.13	74.42 ± 7.32
<i>t</i>		2.194	1.018	0.986
<i>P</i>		< 0.05	> 0.05	> 0.05

the healing related indicators and daily living scores between two groups, $p < 0.05$ will be considered as a significant difference.

Results

Comparison of postoperative functional scores

Excellent postoperative functional scores was observed in 39 cases, good in 19 patients in the control group were excellent in 32 cases, good in 24 cases, there are no significantly difference between the two groups in good rate ($P > 0.05$). As showed in **Table 1**.

Healing related indicators

In observation group, the radiological complete healing time of patients was (121.21 ± 13.65) d, full weight bearing ambulation time was (172.46 ± 17.38) d which was significantly higher than that of the control group ($P < 0.05$), as shown in **Table 2**.

Activities of daily living score

Six months after treatment, the daily living scores of the observation group was significantly higher than that of control group ($P < 0.05$), one and three year after treatment, no significant difference was found for the quality of life between two group ($P > 0.05$), **Table 3**.

Discussions

Different techniques, both conservative and operative, have been proposed for the treatment of calcaneal fractures. Open reduction internal fixation, is still the most popular method.

Previous study [7] found that surgical treatment of typical, closed, displaced calcaneal fractures does not improve outcome when compared with non-operative treatment, and leads to an increase in serious complications. Some researcher [8, 9] found that open reduction and internal fixation with locking calcaneal

plate gives sound functional outcome. We found no difference in patient reported outcome at one and three years between those treated by open reduction internal fixation combine with and those treated non-operatively. There was also no treatment effect on healing rate, but there were differences in patient reported healing related indicators and daily living scores after treatment 6 months.

Participants in this study recovered slowly, regardless of their treatment, reaching a plateau of improvement at about 12 months. After two years, most were still adversely affected by their injury. About 85% had returned to work, although most changed to less physically demanding work, with no difference between groups.

Longer term follow-up also reveal no differences in daily living scores between two groups. Our results support this possibility, with conservative treatment in the observation group have little effect on daily living scores. However, we believe that it is too early to draw such a conclusion, and we plan to report comparisons after five years of follow-up.

To sum up, the results are very encouraging, offering a true minimally-invasive percutaneous stabilization as an alternative in the surgical treatment of calcaneal fractures.

Disclosure of conflict of interest

None.

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